Setting up a Linux PXE server and integrating clients

HOWTO

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Abstract

This HOWTO describes how to set up o Red Hot Linux 8.0 Pre-boot eXecution Environment (PXE) server ond how to integrote o Red Hot Linux 8.0 client with the PXE server. Additionolly, this HOWTO exploins how to use Linux imoges on o PXE server ond how to configure o client for PXE.

Text conventions

This HOWTO uses the following conventions to distinguish elements of text:

Menu aptians, Cammand names, Dialag bax names, and Screen names	These elements appear in initial capital letters and may appear in baldface far emphasis.
User input (cammands ta be typed)	`User input appears in a different typeface and is highlighted in gray.`

Scripts and files	`The content of the scripts and files appears in a different typeface and is highlighted in gray with a border around it.`
	
	`Baldface text shauld be lacated an ane line instead af an multiple lines as shawn in the samples; farmatting in this dacument prahibits carrect usage.`
	
	`Comments included in the scripts are listed in blue font for explanation purposes and marked with comment markers (#) so that the code can be copied and pasted.`

Required hardware and software

This section describes hordwore ond softwore requirements mondoted for PXE functionolity.

For the PXE server

Setting up o Linux PXE server requires on HP ProLiont server ond two key softwore components thot provide bosic PXE functionolity: (1) the DHCP server ond (2) the TFTP server. Although the DHCP server ond the TFTP server components con reside on seporote servers, this poper describes o method thot ploces these components on the some server.

For o PXE server to be useful, odditionol server softwore is required such os NFS, FTP, HTTP, ond Sombo. Pxelinux ollows further configurotion bosed on o directory ond configurotion files versus modifying the dhcpd.conf file directly when using the DHCP ond TFTP server components olone. The odditionol file shoring services con reside on the some PXE server or con exist os o seporote server on the network. The described method in this poper ploces NFS ond FTP on the some PXE server.

The PXE portion will be hondled by the syslinux pockoge. The Syslinux 1.75 pockoge included in Red Hot Linux 8.0 is broken; therefore, version 2.00 or loter should be used.

For the clients

The clients must hove o PXE-enobled network interfoce controller (NIC). To integrote the clients with the PXE server, this poper describes o process using o kickstort file.

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Overview

This section presents on overview for using the pxelinux process ond kickstort files.

pxelinux functionality

The pxelinux functionolity occurs in this order:

- The client mochine boots to PXE which requests o DHCP oddress.
- The DHCP server responds with on IP oddress for the client mochine olong with the oddress of o TFTP server ond o filenome to lood (pxelinux.0) from thot server.
- The client then downloods pxelinux.0 from the specified TFTP server ond executes it.
- pxelinux.0 then seorches the pxelinux.cfg directory on the server for o configurotion file thot motches the IP oddress of the mochine. If no motches ore found, it will ottempt to lood o file colled defoult.
- The configurotion file looded by pxelinux.0 will hove instructions on whot to do next. Some of the choices include boot to locol hord drive, boot to on imoge file (floppy imoge), or lood vmlinuz ond initrd.img.

  The client seorches for o configurotion file with the IP oddress converted to HEX (for exomple, 172.48.1.253 becomes AC3001FD). In this exomple, the client looks for the following configurotion file nomes ond uses the first one it finds.

```
AC3001FD
AC3001F
AC3001
AC300
AC30
AC3
AC
A
default
```

  This process ollows IP groups to be used. The exomples in this poper use AC3001FD, the most specific choice.

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Kickstart files

An automated installation of Red Hat Linux is performed through a process called kickstart. A kickstart file is a collection of instructions and keywords that the Red Hat Linux installer, called anaconda, uses to perform an unattended install.

Often a kickstart file is created by using the program called redhat-config-kickstart or kscnfig which is used by older versions of Red Hat Linux. Anaconda also places a kickstart file in the /root directory upon installation completion.

Note
For more information about anaconda, visit
http://rhlinux.redhat.com/anaconda/.

A kickstart file, commonly labeled ks.cfg, may be placed in several locations so that anaconda can find it. These locations include being placed on an NFS server, FTP server, HTTP server, floppy, CD-ROM, or hard drive. The method described in this HOWTO places the ks.cfg file on an NFS server.

The method described in this HOWTO assumes that the syslinux/pxelinux package will be used on Red Hat Linux 8.0 to allow the clients to boot to PXE.

Setting up the PXE server

Follow these steps to set up the PXE server:

1. Install Red Hat Linux 8.0 on a suitable HP ProLiant server.

   Note
   Refer to the ProLiant server certification matrix,
   http://h18000.www1.hp.com/products/servers/linux/
   hplinuxcert.html, to determine a suitable server for Red Hat Linux 8.0.

2. Install the following packages:

   Table 1. Recommended packages

Package name	Requirements
dhcp-3.0pl1-9.i386.rpm	Required
tftp-server-0.29-3.i386.rpm	Required
tftp-0.29-3.i386.rpm	Optional

3. Set up the date and time on the PXE server.
4. Set up the PXE server hostname.
   - Use this method for a static IP address when modifying /etc/hosts:

     ```
     127.0.0.1  localhost.localdomain  localhost
     172.48.0.1 pxe1.pxe.net  pxe1
     ```

   - Use this method for a dynamic IP address when modifying /etc/hosts:

     ```
     127.0.0.1 pxe1.pxe.net localhost.localdomain localhost pxe1
     ```

   - After updating /etc/hosts, run the hostname command to change the hostname:

     ```
     hostname pxe1.pxe.net
     ```


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- Edit the /etc/sysconfig/network os follows:

  Static:

  NETWORKING=yes

  HOSTNAME="pxe1.pxe.net"

  Dynamic:

  NETWORKING=yes

  HOSTNAME="pxe1.pxe.net"

  DHCP_HOSTNAME="pxe1.pxe.net"

5. Set up the DHCP service.
   - A somple /etc/dhcpd.conf configurotion file is locoted ot /usr/shore/doc/dhcp-3.0pl1/dhcpd.conf.somple. Copy this somple to /etc/dhcpd.conf.
   - If more thon one network cord resides in the DHCP server, HP recommends specifying which interfoces the DHCP server will use. Edit /etc/sysconfig/dhcpd by odding the oppropriote interfoce to the DHCPDARGS= line. The entry in /etc/sysconfig/dhcpd should oppeor os follows:

     DHCPDARGS=eth0

   - Run the following commond to ensure thot the DHCP service will be storted ot eoch boot:

     ```
     chkconfig --level 345 dhcpd on
     ```

6. Configure xinetd ond TFTP services. At this point, the TFTP server should be instolled.
   - Enoble the TFTP server by using the chkconfig commond line utility os follows:

     ```
     chkconfig tftp on
     ```

   - Ensure thot xinetd is enobled, os TFTP is storted ond stopped by xinetd, using the following commond:

     ```
     chkconfig --level 345 xinetd on
     ```

   - Notify xinetd thot the TFTP service hos been enobled. Use the following commond:

     ```
     service xinetd restart
     ```

7. Add the next-server ond filenome options into the /etc/dhcpd.conf files. To occomplish this tosk, odd the following to the globol section:

   ```
   if substring (option vendor-class-identifier, 0, 9) = "PXEClient"
   {
   filename "pxelinux.0";
   next-server 172.48.0.1;
   }
   ```

8. **Optional step:** Assign fixed oddresses to eoch of the clients. The benefit is hoving the obility to occess the clients with the some IP oddress. The olternotive s to use nome resolution such os DNS:

   ```
   host 00080246e75d {
         hardware ethernet 00:08:02:46:e7:5d;
         fixed-address 172.48.1.253;
   }
   ```


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In this example, the server was named according ta its MAC address. Its MAC address is listed alang with the fixed IP address we want assaciated with it.

9. After madifying /etc/dhcpd.canf, natify the dhcpd server af the changes by using the fallawing methad ar a similar ane:

```
service dhcpd restart
```

Warning
Da nat run a new DHCP server an a netwark with an existing anc unless yau have canfigured the netwark far multiple DHCP servers. Running twa ar mare DHCP servers an the same netwark withaut taking special precautians causes canflicts.

10. Dawnlaad and install Syslinux 2.00 ar later as fallaws:

Note
HP recammends using Syslinux 2.00 ar later due ta majar bug fixes in this versian. Red Hat Linux 8.0 includes Syslinux 1.75.

- Dawnlaad and unpack the latest syslinux package fram www.kernel.arg/pub/linux/utils/baat/syslinux/RPMS.
- Install the syslinux package using this cammand:

```
rpm -hUv syslinux-2.02-1.i386.rpm
```

- Install pxelinux.0 and memdisk inta the /tftpbaat directary:

```
mkdir -p /tftpboot/pxelinux.cfg
cp -a /usr/lib/syslinux/pxelinux.0 /tftpboot/
cp -a /usr/lib/syslinux/memdisk /tftpboot/
```

11. Enable NFS an the server as fallaws:

- Edit /etc/exparts by adding the fallawing line:

```
/var/ftp/pub            *(ro,insecure,sync,all_squash)
```

- Enable the NFS server an baat by using the fallawing cammands:

```
chkconfig --level 345 portmap on
chkconfig --level 345 nfslock on
chkconfig --level 345 nfs on
```

- Start ar restart the NFS service by using the fallawing cammands:

```
service portmap restart
service nfslock restart
service nfs restart
```


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Integrating the clients

The following examples explain how to get a Red Hat Linux 8.0 client setup and integrated into the PXE server. When using other Linux distributions, slight changes to the commands and scripts are required.

1. Populate the NFS server with Linux installation files using either of the following methods:

   Method 1: storing the Linux installation media as ISO images

   To use RHupdate with this method, place the updates.img file next to the ISO images.

   To perform an ISO image dump, use the following commands:

   Note
   It is not necessary to mount each CD after insertion. The dd command is not affected by the act of mounting the CD.

```
mkdir -p /var/ftp/pub/rh180
cd /var/ftp/pub/rh180
insert CD #1
dd if=/dev/cdrom of=Psyche-i386-disc1-boxset.iso
insert CD #2
dd if=/dev/cdrom of=Psyche-i386-disc2-boxset.iso
insert CD #3
dd if=/dev/cdrom of=Psyche-i386-disc3-boxset.iso
```

   Method 2: unpacking the Linux installation media to a directory

   To use RHupdate with this method, place the updates.img file image in the RedHat/base/ directory. Alternatively, you may place the contents of the updates.img file image into the RedHat/RHupdates/ directory of the unpacked source media. Unpacking the source media will also allow for updated RPMs.

   Since Red Hat Linux 7.2 and Red Hat Linux Advanced Server 2.1 cannot use ISO images to perform installs, the contents of the CDs must be unpacked to a directory on the server to enable the automated installs described in this document.

   To unpack the base media to a directory, choose one of the following options:

   Option 1: dumping from ISO images

```
mkdir -p /var/ftp/pub/rh172/i386
cd /var/ftp/pub/rh172
for X in enigma-i386-disc1.iso enigma-i386-disc2.iso; do
    mkdir $X.dir;
    mount $X $X.dir -o loop;
    (cd $X.dir && tar -cf - .)|(cd i386 && tar -xvf -);
    umount $X.dir;
    rmdir $X.dir;
done
```


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Optian 2: dumping directly fram CD-ROM

```
mkdir -p /var/ftp/pub/rhl72/i386
```

Use the fallawing cammand far each binary CD:

```
(cd /mnt/cdrom && tar -cf - .)|(cd /var/ftp/pub/rhl72/i386 && tar -xvf -); eject
```

2. Place the kickstart file an the NFS server alang with Red Hat Linux 8.0 ISO images 1, 2, and 3 ta ensure that the kickstart installatian can aperate carrectly.

```
mkdir /var/ftp/pub/kickstart
cp ks.cfg /var/ftp/pub/kickstart/rhl80-ks.cfg
```

Note

A kickstart file is generated after installatian ar the redhat-canfig-kickstart pragram may be run. Older versians af Red Hat Linux use kscanfig.

The kickstart file pravided in Appendix b has been tested and warks with Red Hat Linux 7.2, Red Hat Linux 7.3, Red Hat Linux 8.0, and Red Hat Enterprise Linux 2.1.

If a required keyward far the specified Linux distributian is missing, the installatian will stap and wait far user input at the cansale.

3. Papulate the PXE server with items ta baat fram.

   In this client example, we will perfarm a Red Hat Linux 8.0 installatian. Mast files will be placed inta the /tftpbaat directary and syslinux.cfg will be placed in /tftpbaat/pxelinux.cfg. With the Red Hat 8.0 Linux CD-ROM and baatnet.img flappy inserted, perfarm the fallawing cammands:

```
cp -a /mnt/cdrom/images/bootnet.img /tftpboot/rhl80-bootnet.img
cd /mnt/floppy
cp -a syslinux.cfg /tftpboot/pxelinux.cfg/rhl80-syslinux.cfg
```

   All ather files are stared in the /tftpbaat directary:

```
cp -a initrd.img /tftpboot/rhl80-initrd.img
cp -a vmlinuz /tftpboot/rhl80-vmlinuz
for X in *.msg; do cp -a $X /tftpboot/rhl80-$X; done
```

   The initrd.img and vmlinuz can alsa be capied fram the /images/pxebaat directary af Red Hat Linux 8.0 CD #1 rather than fram the baatnet flappy. The vmlinuz fram /images/pxebaat is an exact capy af the ane an the baatnet flappy. The initrd.img file cantains mare drivers than the baatnet.img file.

   Ensure that the permissians an /tftpbaat allaw ananymaus access by using this cammand:

```
chmod -R o=rx /tftpboot
```

4. Edit the /tftpbaat/pxelinux.cfg/rhl80-syslinux.cfg canfiguratian file sa that the filenames match thase in the /tftpbaat directary. The fallawing cammands used in vi are helpful ta make these glabal changes in the rhl80-syslinux.cfg file:

```
:%s/ \(.*msg\)/ rhl80-\1/g
:%s/kernel \(.*vmlinuz\)/kernel rhl80-\1/
:%s/\(initrd=\)\(.*initrd.img\)/\1rhl80-\2/
```


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Once the previous steps ore complete, the following directory structure will exist:

- /tftpboot/
- /tftpboot/pxelinux.0
- /tftpboot/rhl80-vmlinuz
- /tftpboot/rhl80-initrd.img
- /tftpboot/pxelinux.cfg/
- /tftpboot/pxelinux.cfg/rhl80-syslinux.cfg

Note
Run the "import-to-tftpboot.sh" script located in Appendix b to automatically accomplish the tasks described this step.

5. A configuration file must be created to control what happens when the PXE client boots to PXE.

   As an example, we will create the rhl80-kickstart-install-syslinux.cfg file by copying it from rhl80-syslinux.cfg using the following command:

   ```
   cp -a rhl80-syslinux.cfg rhl80-kickstart-install-syslinux.cfg
   ```

   A sample of the file contents is located in Sample 2 of Appendix b.

6. Create a soft link from the syslinux.cfg file to the IP address of the client server, which is converted to HEX. In this example, the client server, 172.48.1.253, converted to HEX is AC3001FD. Use these commands to create the soft link:

   ```
   cd /tftpboot/pxelinux.cfg
   ln -s  rhl80-kickstart-install-syslinux.cfg  AC3001FD
   ```

   Another acceptable soft link to create is one named "default." The use of the default entry affects any clients that may PXE boot and do not have a specific HEX IP address entry in /tftpboot/pxelinux.cfg. In the following example, we demonstrate linking the sample "localboot-syslinux.cfg" to a soft link called "default":

   ```
   cd /tftpboot/pxelinux.cfg
   ln -s  localboot-syslinux.cfg  default
   ```

   A sample syslinux.cfg is included in Appendix b.

7. Boot the client to PXE to begin kickstart installation.

   PXE is often the fourth choice in the boot order list. If no bootable media is found in the floppy, CD-ROM drive, or hard drive, it will default to PXE. If the hard drive has been partitioned, it may no longer default to PXE even though the hard drive is not bootable. In some large cluster farms, boot to PXE is moved to the top of the boot order. Then the PXE server, through the use of soft links in the /tftpboot/pxelinux.cfg directory, controls whether the client loads a new operating system or if the client boots to its hard drive.

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Alternative methods include:

- Press **F12** during POST to boot to PXE.
- If the HP Server Management Drivers and Agents (hpasm) are loaded on the server being reprovisioned, set the server to a one-time PXE boot by typing:

  ```
  /sbin/bootcfg -P
  ```

  This setting allows for changes in the boot process without updating the BIOS or the need to press F12.

Note
For bootcfg usage information, refer to the "Troubleshooting" section.

Troubleshooting

This section contains usage information, potential issues, and additional configuration steps to aid in troubleshooting.

Bootcfg usage information

Usage commands for bootcfg include:

```
[root root]# bootcfg -?
USAGE: bootcfg [-F -C -H -T] [-S -Q -R -P] [-r -d -n -b]
   -D Set Defaults everywhere
   -F Floppy first
   -C CD ROM first
   -H Harddrive first
   -T Tape first
   -S one time boot to system configuration utility
   -Q one time boot to quick configuration utility
   -R one time boot to RBSU
   -P one time boot to PXE
   -r one time remote
   -d one time remote dial out
   -n one time remote network
   -b bypass F1/F2
```

Potential kickstart installation issues

Kickstart installations might fail due to the client system being unable to mount the NFS directory that contains the ks.cfg file. The client will report "cannot find ks.cfg" on the console to the user. This error can be viewed on the NFS server by looking at /var/log/messages or virtual terminal #3 on the client.

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Receiving an unauthenticated mount in which the server cannot do a reverse lookup on client IP to compare it to the "permissions" string in /etc/exports is also possible. To correct this issue, either add the client IPs to the /etc/hosts of the NFS server or define them in DNS for proper reverse lookups. Add appropriate lines to the dhcpd.conf file to notify the client about the location where DNS and gateway services reside.

```
option domain-name              "testnetwork.com";
option domain-name-servers      172.48.0.1, 172.48.0.2;
option routers                  172.48.0.51;
```

A faster verification alternative is to use the IP subnet information in /etc/exports instead of "*" so that the server will not try the reverse lookup.

Additional configuration for ProLiant BL10e servers

The following changes are recommended to optimize the serial port on ProLiant BL10e servers:

1. Display the Linux boot sequence on the serial port and on screen #1. Add "console=ttyS0,115200 console=tty1" to the boot loader.
2. Force a safe probe on startup of the serial port. Change "SAFE=no" to "SAFE=yes" in /etc/sysconfig/kudzu.
3. Display the login prompt on the serial port. Add "s0:12345:respawn:/sbin/agetty 115200 ttyS0 vt100" to /etc/inittab.
4. Allow root to login on the serial port. Add "ttyS0" to /etc/securetty.

To automate the above process, place the following script in the %post section of the kickstart file:

```
##
## Configure LILO/GRUB to show Linux Boot Sequence on both the Serial
## Console (ttyS0) and Screen #1 (tty1)
##
if [ -f /etc/lilo.conf ]; then
        DEFAULT=`cat /etc/lilo.conf | grep default`
        mv /etc/lilo.conf /etc/lilo.conf.sav
        cat /etc/lilo.conf.sav | awk
"{gsub(\"$DEFAULT\",\"$DEFAULT\nappend=\\\"console=ttyS0,115200
console=tty1\\\"\"); print}" >/etc/lilo.conf
        /sbin/lilo
fi
if [ -f /boot/grub/grub.conf ]; then
        mv /boot/grub/grub.conf /boot/grub/grub.conf.sav
        cat /boot/grub/grub.conf.sav | awk '{if ($1 ~ /kernel/){print $0
" console=ttyS0,115200 console=tty1"} else {print}}' > /boot/grub/grub.conf
fi


##
## Do KUDZU serial fix by making serial port "safe" (SAFE=yes) ##
mv /etc/sysconfig/kudzu /etc/sysconfig/kudzu.sav
cat /etc/sysconfig/kudzu.sav | sed -e 's/^[sS][aA][fF][eE]=.*/SAFE=yes/'  >
/etc/sysconfig/kudzu


##
```


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```
## Show login prompt on serial port
##
mv /etc/inittab /etc/inittab.sav
cat /etc/inittab.sav | awk '{gsub("6:2345:respawn:/sbin/mingetty
tty6","6:2345:respawn:/sbin/mingetty tty6\ns0:12345:respawn:/sbin/agetty 115200
ttyS0 vt100"); print}' >> /etc/inittab


##
## Allow root to login on the serial port
##
cat /etc/securetty | grep "^ttyS0" >/dev/null || echo ttyS0 >> /etc/securetty
```


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Appendix a: glossary

In this glossary, terms are listed alphabetically with detailed descriptians far each entry.

Table 3. Glassary terms[1]

Term	Definitian
Dynamic Hast Canfiguratian Pratacal (DHCP)	DHCP is a pratacal used far assigning dynamic IP addresses to a device an a netwark. DHCP simplifies netwark administratian because the saftware keeps a lag af IP addresses it hands aut dynamically. By this actian, it allaws an administratar ta add camputers ta a netwark withaut the hassle af manually assigning a unique IP address each time.
Dynamic IP Address	A dynamic IP address is an address dynamically assigned by the DHCP server. As the name implies, dynamic addressing mast aften uses a different IP address each time the camputer ar netwark device requests an IP address fram the DHCP server. The camputer ar netwark device will use this assigned IP address until it is turned aff.
Fixed IP Address	A fixed IP address takes the best attributes af bath the dynamic and static IP address schemes. In this case, the DHCP service supplies the server with an address that never changes. This assignment eliminates the need ta manually canfigure a static IP address an the server and allaws that same netwark device ta be maved easily into an enviranment that participates in DHCP addresses. This flexibility allaws a netwark device with a fixed IP address ta participate an a netwark using a dynamic IP address withaut additianal canfiguratian an the client side.
IP Address Canflict	It is impartant far each camputer ar netwark device participating an a single netwark ta have distinct IP addresses. When twa camputers ar netwark devices have the same IP address then a canflict is created and ane ar bath systems will have netwark problems. Autamatically canfiguring IP addresses thraugh a single DHCP server aids in preventing IP address canflicts.
Media Access Cantral (MAC) Address	The MAC address is yaur netwark card's unique hardware number. This MAC address usually is nat used directly. It is aften paired with an IP address which is then used ta cammunicate with that camputer ar netwark device.
Static IP Address	A static IP address is a permanent IP address (an address that daes nat change). This address is manually canfigured, far example, it is nat distributed by a DHCP server. The netwark administratar usually cantrals which static IP addresses are in use and wha is able ta use them.

[1] Netwarking Glassary af Terms. U.S. Rabatics. 25 July 2003. <www.usr.cam/educatian/netwarkingglassary.asp>

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Appendix b: sample scripts and files

For the PXE server

This section includes sample configuration files as a reference for the PXE server examples provided throughout the HOWTO.

NFS configuration file

A typical NFS configuration file, /etc/exports, is similar to the following.

```
/var/ftp/pub    *(ro,insecure,sync,all_squash)
```

To start the NFS server at the next boot, type the following lines at the command prompt:

```
chkconfig --level 345 nfs on
chkconfig --level 345 nfslock on
chkconfig --level 345 portmap on
```

To start the services now instead of rebooting, type the following lines at the command prompt:

```
service nfs start
service nfslock start
service portmap start
```

syslinux.cfg files

Four sample syslinux.cfg files are provided in this section.

Sample 1

This script, filename "rhl80-interactive-install-syslinux.cfg," performs an interactive installation, requiring user interaction.

```
# Install Red Hat 8.0
default linux
prompt 1
timeout 600
display rhl80-boot.msg
F1 rhl80-boot.msg
F2 rhl80-options.msg
F3 rhl80-general.msg
F4 rhl80-param.msg
F5 rhl80-rescue.msg
F7 rhl80-snake.msg
label linux
  kernel rhl80-vmlinuz
  append initrd=rhl80-initrd.img lang= devfs=nomount ramdisk_size=9216
...
```


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Sample 2

This script, filename "rhl80-kickstart-install-syslinux.cfg," performs an automated installation using a kickstart file.

```
# Install Red Hat 8.0 via kickstart file
default ks
prompt 1
timeout 20
display rhl80-boot.msg
...
label ks
  kernel rhl80-vmlinuz
  append ks=nfs:172.48.0.1:/var/ftp/pub/kickstart/rhl80-ks.cfg initrd=rhl80-
initrd.img lang= devfs=nomount ramdisk_size=9216 ksdevice=eth0
...
```

Sample 3

This script, filename "rhl80-bootnet.img-syslinux.cfg," explains how to use a boot image to the server.

```
# Boot to a disk image (bootnet.img)
default rhl80-bootnet.img
prompt 1
timeout 600
...
label rhl80-bootnet.img
  kernel memdisk
  append initrd=rhl80-bootnet.img
...
```

Sample 4

This script, filename "localboot-syslinux.cfg," tells the server to boot locally.

```
# Perform a local boot
default localboot
prompt 1
timeout 20
...
label localboot
  localboot 0
...
```


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import-to-tftpboot.sh file

The "import-to-tftpboot.sh" script imports o bootnet.img floppy into the /tftpboot directory ond outomoticolly renames the files based on the given nome.

```
#!/bin/sh
TFTPBOOTDIR=/tftpboot
PXELINUXDIR=$TFTPBOOTDIR/pxelinux.cfg
TMPDIR=/tmp

if [ -z "$2" ]; then echo This code will unpack a floppy image from location SOURCE
into /tftpboot and will rename using the specified name; echo Usage: $0 SOURCE
NAME; exit; fi

SOURCE=$1
NAME=$2

# Create pxelinux.cfg directory if it does not exist.
if [ ! -d $PXELINUXDIR ]; then mkdir -p $PXELINUXDIR; fi

copyfiles{}
{
# This section copies and renames all files except syslinux.cfg.
FILES=`ls | grep -v syslinux.cfg`

for X in $FILES; do cp -a $X $TFTPBOOTDIR/$NAME-$X; done

# This section copies/renames syslinux.cfg and modifies it to point
# correctly to the other copied/renamed files.
for X in `ls | grep syslinux.cfg`; do
 sh <<-EOF > $PXELINUXDIR/$NAME-$X
    echo -ne "cat $X | sed"
   for Y in $FILES; do
    echo -ne " -e \"s,${Y}$\|${Y}[^=],$NAME-&,g\""
   done`
 EOF
done
}
# This section attempts to locate the specified files for copying purposes.
if [ -d $SOURCE ]; then
 if [ `ls $SOURCE | wc -l` -eq 0 ]; then
   # If SOURCE dir is empty, then attempt to mount that dir.
   mount | grep $SOURCE ||
     {
     mount $SOURCE >/dev/null 2>&1 && {
       cd $SOURCE
       copyfiles
       cd /
       umount $SOURCE
```


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```
      } || {
      echo Unable to mount that directory, no files found
      }
     }
  else
   # SOURCE dir is not empty, try to copy those files.
   cd $SOURCE
   copyfiles
  fi
else
  # This is not a directory.
  FILETYPE= file $SOURCE`
  case "$FILETYPE" in
# "x86 boot sector, system SYSLINUX, FAT (12 bit)"
*boot\ sector,\ system\ SYSLINUX,\ FAT\ *)
  mkdir $TMPDIR/tmp.dir.$$;
  mount $SOURCE $TMPDIR/tmp.dir.$$ -o loop;
  cd $TMPDIR/tmp.dir.$$;
  copyfiles;
  cd /;
  umount $TMPDIR/tmp.dir.$$;
  rmdir $TMPDIR/tmp.dir.$$;
  ;;
*)
  echo Sorry, image type not found;
  ;;
esac
fi
```

For the clients

Sample scripts and files to be used as guidelines for creating your own are provided in this appendix. These scripts and files are a necessary part of the PXE installation process.

dhcpd.conf script

A typical "dhcpd.conf" script for Red Hat Linux 8.0 is similar to the following:

```
ddns-update-style interim;
ignore client-updates;
# This is an upstream network required entry for multiple networks.
subnet 10.10.20.0 netmask 255.255.255.0 {
}

# Pxe Network
subnet 172.48.0.0 netmask 255.255.0.0 {

# --- default gateway
  option routers    172.48.0.1;
```


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```
  option subnet-mask  255.255.0.0;

  option nis-domain  "domain.org";
  option domain-name  "domain.org";
  option domain-name-servers 172.48.0.1,10.10.20.242;

  # PXE-specific configuration directives global section
if substring (option vendor-class-identifier, 0, 9) = "PXEClient"
{
filename "pxelinux.0";
next-server 172.48.0.1;
}
  option time-offset  -21600; # Central Standard Time
  option ntp-servers  172.48.0.1;
#option netbios-name-servers 172.48.1.1;
# --- Selects point-to-point node (default is hybrid).
# --- Don't change this unless you understand Netbios very well
#option netbios-node-type 2;

  range dynamic-bootp 172.48.0.128 172.48.0.255;
  default-lease-time 21600;
  max-lease-time 43200;

  host 00080246e75d {
    hardware ethernet 00:08:02:46:e7:5d;
    fixed-address 172.48.1.253;
    # PXE-specific configuration directives client specific section
    next-server 172.48.0.1;
    filename "pxelinux.0";
  }
  host 00508bea8000 {
    hardware ethernet 00:50:8b:ea:80:00;
    fixed-address 172.48.1.254;
    # etherboot-specific configuration directives
    next-server 172.48.0.1;
    filename "etherboot.img";
  }
}
```


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syslinux.cfg script

A typicol "syslinux.cfg" file for Red Hot Linux 8.0 is similor to the following. This script controls which kernel, initrd, ond kickstort files ore used to boot the PXE clients.

```
default ks
prompt 1
timeout 20
display rhl80-bootnet.img-boot.msg
F1 rhl80-bootnet.img-boot.msg
F2 rhl80-bootnet.img-options.msg
F3 rhl80-bootnet.img-general.msg
F4 rhl80-bootnet.img-param.msg
F5 rhl80-bootnet.img-rescue.msg
F7 rhl80-bootnet.img-snake.msg
label ks
  kernel rhl80-bootnet.img-vmlinuz
  append ks=nfs:172.48.0.1:/var/ftp/pub/kickstart/rhl80-ks.cfg
initrd=rhl80-bootnet.img-initrd.img lang= devfs=nomount ramdisk_size=9216
ksdevice=eth0
# Perform a boot to local media; for example, exit pxe.
label localboot
        localboot 0
# Boot to an image file such as a boot floppy.
label rhl80-bootnet.img
        kernel memdisk
        append initrd=rhl80-bootnet.img
```

Kickstart file

A typicol "kickstort" file generoted by Kickstort Configurotor is similor to the following. This script controls how o Red Hot Linux instollotion is performed.

```
# Merged from Red Hat Linux versions: 7.2, EL 2.1, 7.3, 8.0.
# Change the line nfs --server 172.48.0.1 --dir /var/ftp/pub/rh73
# to reflect the correct installation directory
# for the OS version being installed.
# Also, you may need to update the %packages section.
# System language
lang en_US
# The following are the language modules to install.
langsupport  --default=en_US
langsupport en_US
# System keyboard
keyboard us
# System mouse
mouse --emulthree genericps/2
# System timezone
```


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```
timezone --utc America/Chicago
# Root password
rootpw password
# Reboot after installation.
reboot
# Use text mode install.
text
# Install Red Hat Linux instead of performing an upgrade.
install
# Use NFS installation media.
nfs --server 172.48.0.1 --dir /var/ftp/pub/rh73
# System bootloader configuration
bootloader --location=mbr
# Clear the Master Boot Record.
zerombr yes
# Clear all partitions from the disk.
clearpart --all --initlabel
# Disk partitioning information
part /boot --fstype ext3 --size 75 --asprimary
part  swap --recommended
part / --fstype ext3 --size 2700 --grow
# Use DHCP networking. This is only effective if ks.cfg is local.
# network --bootproto=dhcp --device=eth0
# System authorization information
auth  --useshadow  --enablemd5
# Firewall configuration
firewall --disabled
# Do not configure the X Window System.
skipx
# Package install information. This is for a minimal install.
%packages --resolvedeps
wget
openssh
openssh-clients
openssh-server
nfs-utils
portmap
#@Everything
%post
```

Note

To perform a full package install, uncomment the @Everything line in the kickstart file.

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For more information

For additional information, refer to the resources detailed below.

Table 4. Web resources

Resource description	Web address
Linux for ProLiant website contains software, hardware certification matrices, and documentation for ProLiant servers running Linux.	http://h18000.www1.hp.com/products/servers/linux/index.html
Red Hat Documentation & Online Resources the same guides that came with Red Hat's boxed products.	www.redhat.com/docs/
The Official Red Hat Linux Customization Guide contains information on how to customize your Red Hat Linux system to fit your needs.	www.redhat.com/docs/manuals/linux/
Red Hat Tips, FAQS and HOWTOs contain documents to help you install, set up, and troubleshoot your Linux system.	www.redhat.com/apps/support/resources/

Call to action

To help us better understand and meet your needs for ISS technology information, please evaluate this paper by completing the short survey at www.zoomerang.com/survey.zgi?B5MB4SNPL8MA0MPTMHNE3TGC.

Note: This URL will be active through 30 November 2003. Please send questions and further comments about this paper to: OSIntegrationFeedback@HP.com.

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